the same time we may remind Dr. Anderson that the statement that the sternum in *all* Picarian birds has a "double notch behind" (p. 94) is not quite correct, and that he has overrated the number of African rhinoceroses.

Judging from the "Guide," the series of animals now exhibited in the Zoological Gardens of Calcutta must be considerable, although no actual statistics are furnished to us on the subject. Several animals of special rarity are mentioned as in the collection, such as a specimen of Grant's Gazelle (*Gazelle granti*) from East Africa, and the *second* known example of the Hairy-eared Rhinoceros of Chittagong. It is also of great importance to learn that the phenomenon of incubation of one of the large Pythons has been witnessed in Calcutta as well as in European Gardens. On the whole, the naturalist will find many things to interest him throughout the present volume, though, as already said, some of the disquisitions are not perhaps quite suitable to a popular work.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

Earthquakes and Air-Waves

IN the *Comptes Rendus* of the French Academy of Sciences for February 18, 1884, there appears a communication from Prof. Förster of Berlin relative to a statement previously made in the *Comptes Rendus*, to the effect that it was from observations taken at Berlin that he had arrived at certain conclusions as to the propagation of the atmospheric disturbance caused by the last great explosion in the eruption of Krakatoa in August last.

Prof. Förster explains that the statement referred to was a mistake, and that he had in fact only reproduced, after verifying them by reference to the Berlin observations, the conclusions come to by me, as explained in a paper read before the Royal Society on December 17, 1883, the principal part of which was published in NATURE of December 20 last (p. 181).

He adds that in his original note on the subject he had not mentioned my name as the author of the conclusions referred to, in consequence of the manner in which I had spoken of them myself.

Prof. Förster, while putting himself right on this point, has interpreted my own intention with great sagacity. For the light I may have been able to throw on the facts was in truth consequent on information put before me by the intelligent officers of our Meteorological Office, aided by a suggestion from Prof. Stokes, who like myself is a member of the Meteorological Council.

Such credit, however, as is due for bringing to notice the curious phenomenon in question may be fairly claimed for our Meteorological Office, as there is little reason to doubt that it would have remained unnoticed had it not been for the comparison of the several records of the continuously self-registering instruments which the organisation provided from the public grant we receive has placed at our command, and which no individual effort could have supplied.

February 26 RICHARD STRACHEY

IN the Jamaica Weather Report, No. 35, for November last year, I was unable to explain how it was that the Krakatoa air-wave had affected our barometer so strongly: the explanation is that Jamaica is very near the antipodes of Krakatoa (NATURE, vol. xxix. p. 181).

The general effect of the disturbance at Jamaica was to produce a barometric depression, preceded and followed by small barometric elevations, according to the following table, which gives for local time the pressure of the atmosphere at the sea-level, expressed in inches of mercury at 32°, and corrected for diurnal variation:—

Kingston, Jamaica, 1883

		in.
August 26,	3 p.m.	29·972
26,	11 p.m.	·975
27,	7 a.m.	·982
27,	3 p.m.	·944
27,	11 p.m.	·983
28,	7 a.m.	·994
28,	3 p.m.	29·975

Now the impulse at Krakatoa occurred at 9.24 a.m. local time, and it reached Jamaica about 3 p.m. local time, or eighteen hours afterwards; consequently the average velocity of the wave was about 690 miles an hour—which is wholly in accordance with the velocity deduced by General Strachey from places in Europe and elsewhere.

But there was no great explosion at Krakatoa at 9.24 a.m., and it seems possible that this great air-wave was similar to the air-waves we always experience in Jamaica whenever there is a shock in Kingston sufficiently strong to be distinctly felt.

In August 1881 I published a Report on Earthquakes in Jamaica, No. 4, in order to call attention to the following facts:—

1. The atmospheric pressure oscillates for some hours before and after a shock, the lowest depression generally occurring at the time of the shock.

2. The wind generally lulls, so that "the weather" is hot and oppressive.

3. Clouds (stratus) gather over the sky after the shock.

4. The temperature of the air, if we allow for the cooling effect of (3), remains unchanged.

5. The rainfall is unaffected.

These facts have been fully confirmed by subsequent shocks. As an example let us consider the last shock which occurred on January 14 this year, and which was felt over nearly the whole of the island.

At Kingston it was felt as a sharp double-shock at 1.15 p.m.; the first shock lasted about three seconds, then there was an interval of about two seconds, which was followed by the second shock, lasting about five seconds. There was a strong sea-breeze blowing during the day, but a temporary lull occurred just before the earthquake.

The following table gives the pressure of the atmosphere at the sea-level, expressed in inches of mercury at 32°, and corrected for diurnal variation:—

Kingston, January 14, 1884

	in.
24 hours before the shock	30·061
16 ,, ,, ...	·047
8 ,, ,, ...	·043
At the time of the shock	·016
8 hours after	·024
16 ,, ...	·063
24 ,, ...	30·056

On January 13 the average amount of cloud was 7 per cent. of the whole sky, on the 14th it was 10, and on the 15th it was 43!

Further particulars will be found in the Jamaica Weather Report, No. 37, for January 1884, and it will here be sufficient to remark that the depression at the time of the shock was quite as strongly marked at the cinchona plantation, thirteen miles from Kingston, but 4850 feet above the sea-level.

It is needless to say that I am at a loss to account for the connection which most undoubtedly exists in Jamaica between earthquakes and air-waves; but it is evident that the latter may be connected with the former without any, the slightest, approach to volcanic explosion; and the Krakatoa air-wave was probably similar in all respects, except magnitude, to the waves we continually experience in Jamaica at the time of earthquake shocks.

Jamaica, February 7 MAXWELL HALL

The Remarkable Sunsets

AT 8.45 a.m. to-day the sun seen from here through a light mist was of a slightly metallic and very pale sea-green colour. The mist was not dense enough to render objects at a distance of twelve yards indistinct, but beyond that distance they rapidly became invisible. There was no wind, and the mist seemed free from smoke. I could form no opinion as to its height. Half

an hour later, in Manchester, the sun glowed with the ordinary coppery-red hue it assumes when seen through a thin fog.

EDWARD J. BLES

Moor End, Kersal, near Manchester, February 26

Instinct

I DO not think that the difference between Mr. Lloyd Morgan and myself on the point to which he returns in his last letter is so great as it at first appeared. For he now admits that "the actions of animals testify to some corresponding mental states," and therefore that from such actions we are entitled to infer something as to these states. His objection to comparative psychology as a science is thus reduced to the observation that our inference from bodily actions to mental states cannot be so clear or certain in the case of animals as in the case of men, where intentional sign-making, or language, comes to our assistance. Now this is precisely what I argued in my own communication to NATURE (p. 379), and also in my books. Therefore I do not consider that this is "an ingeniously constructed argument of scepticism"; I applied that phrase to the argument which denies the possibility of all or any ejective knowledge, both of men and animals.

Thus the only point of dispute between us is whether such conceptions as we can form of the mental life of animals are sufficient to constitute this mental life the subject-matter of a science—*i.e.* whether this mental life admits of investigation. And, so far as I am aware, Mr. Morgan is the only individual who has ever said that such is not the case.

GEORGE J. ROMANES

THERE is a remarkable instance of instinct displayed by the common magpie which I have not seen noticed in NATURE or anywhere else, although it has long attracted my attention and is well known to farmers in the west of Scotland. This bird may be seen each year, on the first Sunday of March (old style), very busily employed carrying small twigs of branches to renew its old nest or form a new one for the approaching breeding season. This particular day appears to be appointed for taking formal possession of the premises, as no more work whatever is done for some weeks after. The instinct which enables a bird to take the sun's altitude on a particular day in March is certainly a very rare gift, but any person who wishes to satisfy himself of its truth, and who lives in a locality where these birds breed, has only to rise early on Sunday, March 16, this year, to see them at work for himself. It would be interesting to know within what degrees of latitude this particular day is observed by these birds.

WM. BROWN

"Mental Evolution in Animals"

I AM as unwilling as Mr. Romanes to continue this discussion needlessly, but inaccuracy calls for correction. Mr. Romanes says that "the glass wall of a tank is not an object upon the solidity of which a skate would be likely to calculate." If he will read my original account of the incident again, he will find that the skate made himself absolutely sure of the solidity of the glass wall of the tank; he tried hard to seize the food, and failed because he could not get his head through the glass, and therefore his mouth could not touch the food. As for his being unable to see the food when the current lifted it, that is precisely my case. But he saw it clearly enough, and had tangible experience of the conditions, before he adopted the successful device. If the matter is worth noticing, it may as well be described correctly.

F. J. FARADAY

Manchester, February 29

I WILLINGLY apologise for making the remark about the glass wall without having first consulted Mr. Faraday's original account; but as, in "noticing" the matter in "Animal Intelligence," I quoted that account *verbatim*, I cannot allow that on the only occasion when I "described" the circumstances, I failed to do so "correctly."

G. J. ROMANES

Natural Snowballs

IT is nearly a year since I inclosed to you an account of the natural snowballs or snow-rollers which were to be seen in great numbers for many square miles in this vicinity on February 21, 1883. A friend has called my attention to a brief newspaper report of a recurrence of the same remarkable phenomenon on a larger scale in Oneida and Herkimer counties, in the State of New York. The rollers were formed by the wind on the night of Tuesday, January 22, and are said to have been "innumerable," hundreds being seen on an acre of ground. The measurements of the largest are the same as those which I made of the largest that I saw last year, 18 inches in length and 12 in diameter. But, whereas all of last year's were extremely delicate, so as to yield to the touch, it is reported that some of those seen in January were "solid and so firm that they could be handled quite roughly without breaking." I send these memoranda to you, thinking that you may deem them worthy of preservation in the columns of your journal.

SAMUEL HART

Trinity College, Hartford, Conn., U.S.A., February 16

Common Domestic Duck Diving for Food

WHEN at Buxton last August I spent a good deal of my time in watching and occasionally feeding the water-fowl in the ponds of the garden. On week-days the ducks received large contributions from the visitors, but on Sundays they apparently were on rather short commons, judging by their greater activity in searching for food, and constantly standing *on their heads* in the water so as to search the bottom for aquatic plants. Of course every scrap of plant to the depth of ten or fifteen inches (eighteen inches where the geese were) was cleared away.

I was surprised one Sunday to see a common domestic duck (female) diving in three or four feet of water, and searching along the bottom, as if she had been "to the manner born," for plants, which, when she found, were brought to the surface; some fifteen or twenty other ducks watched her proceedings with great interest, and made an immediate rush at her when she came up to share in the food, exactly as the widgeon pounce upon the canvas-back ducks at the mouth of the Delaware River and other favourite winter feeding-places of these delicious birds, which, notwithstanding their difficulties with their thievish tormentors, must manage to pick up a fairly good living, as when killed they are usually in fine condition.

I saw only one duck (a mallard) at Buxton make any attempt to imitate the clever diver, but his efforts were always ignominious failures. Had I been living in Buxton I should have endeavoured to get some eggs of this diving duck and had them hatched, with the object of finding out if the progeny inherited the peculiarity of the mother.

JOHN RAE

4, Addison Gardens, March 1

Circular Rainbow seen from a Hill-top

IN the evening of the first Sunday in last September, when, it will be remembered, there was a very severe storm, I was walking alone up the south side of the top of the Belchen, in the Black Forest; the sun was setting in the west over the Rhine, and for some time my shadow was thrown on the mist filling up the valley to the east of the Belchen, and around it was a most distinct rainbow, with all the usual colours. It was so striking that it at once suggested the halo one sees in religious pictures, except that it was round the whole figure, and not confined to the head. I thought this anecdote might interest those gentlemen who have already written to you about this beautiful phenomenon, and especially Mr. Maynard, who I see writes from the Black Forest.

W. HALE WHITE

4, St. Thomas's Street, S.E., March 1

Girton College

IN reference to a paragraph in NATURE (vol. xxix. p. 388) respecting the representation of the students of the College Hall of Residence, Byng Place, on their governing body, allow me to state that the students of Girton College have been represented on the College Committee for some seven years past. The representatives of the students are three in number, one retiring annually; they are elected by those students who hold the college certificate, and have been chosen, so far, from among themselves. As the certificated students keep up a more or less close connection with the College, and their representatives pay regular visits of inspection, the views of past and present students can be formally laid before the College Committee. This privilege is much appreciated by the students. If you have received no other letter to this effect, may I ask you to insert the above information?

CERTIFICATED STUDENT

February 26